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Operating Instructions

PMD02

Digital manometer

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SECTION A - Model without limit switch

A 1.0 Installation and Commissioning

The pressure tapping points should be prepared in accordance with the indications given for the sockets. For more details, see e.g. regulation VDE/VDI 3511 and 3512, sheet 3, also DIN 837-1/2. Suitable for sealing are sealing washers to DIN 16258. The correct tightening torque is depending on material and shape of the used seal. It should not exceed 80 Nm. The mounting position should not be subject to strong vibration and radiation heat. The transmitters with digital display are immediately ready for service after the pressure and electrical connections have been made.

A 2.0 Electrical Connection

Electrical connection is made by shielded cable and means of the cable box. Precise wiring schemes can be seen in the drawings. In addition, wiring details and required power supply are given on the rating plate.

Significance of applied terminal designations:

Ub+ / 0V	supply voltage
S+ / S-	output signal
Protection / PE	cable shield

A 2.1 Current Output

Output signal:	4 ... 20 mA / 2 wire system 0 ... 20 mA / 3 wire system
Power supply:	Ub = 17 ... 30 V DC
Maximum load:	Ra = (Ub - 17V) / 20 mA

If current output not used, please connect terminal 2 and 3.

A 2.2 Voltage Output

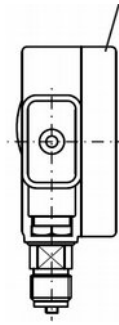
Output signal:	0 ... 10 V / 3 wire system
Power Supply:	Ub = 17 ... 30 V DC
Maximum load:	Ra ≥ 10 kΩ

A 3.0 Service and Maintenance

The transmitter with digital display described hereunder is maintenance free. It incorporates no components which have to be repaired or replaced on the site. Repairs will exclusively be carried out at the factory. Depending on working conditions, the pressure transmitter should be checked about once a year to ensure that they are within their specifications and be adjusted if necessary. The calibration procedure is as follows: As reference for checking and adjusting the measuring span, an adequately accurate pressure standard is required.

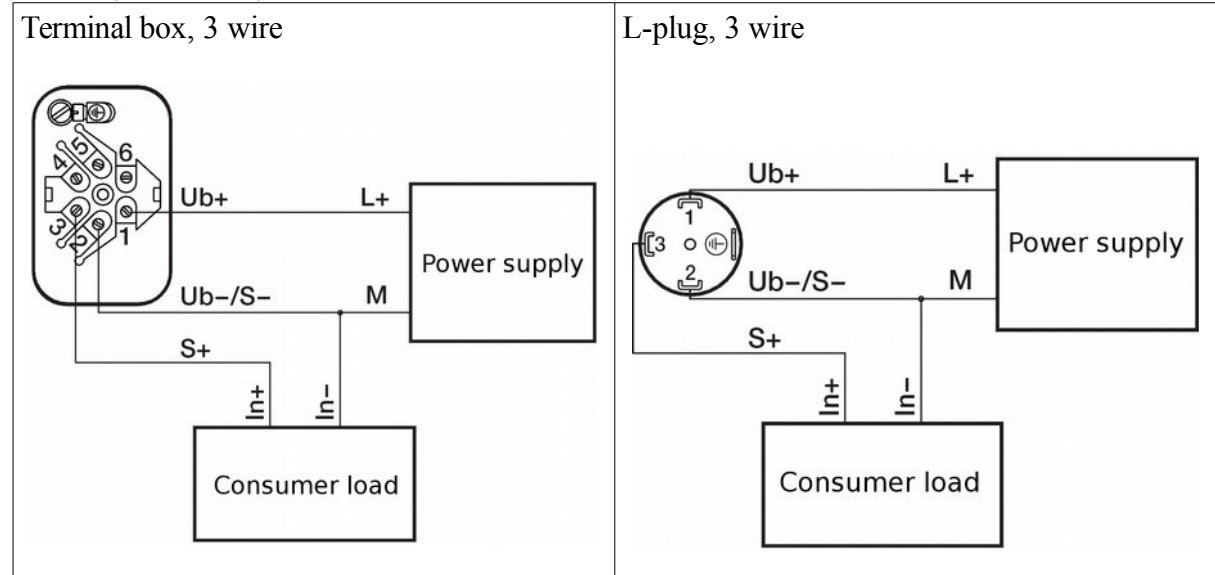
- For readjustment, loosen, with a left-hand rotation, the cam ring (bayonet type), and remove from casing with the window.
- Set zero point by potentiometer „ZERO“.
- Set span by potentiometer „SPAN“.
- After having carried out service and maintenance work, lock tightly the instrument with the cam ring (bayonet type), the window and the sealing.

Cam ring (bayonet type)



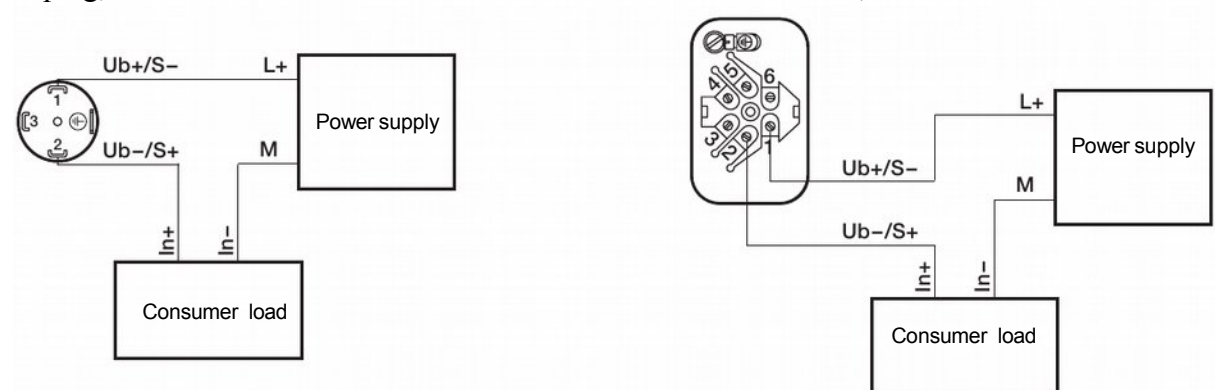
A 4.0 Wiring and Pin Layout

0...10 V, 0...20 mA, LED versions



4...20 mA, LCD version

L-plug, 2 wire



SECTION B - Model with rechargeable battery

B 1.0 Installation and Commissioning

The pressure tapping points should be prepared in accordance with the indications given for the sockets. For more details, see e.g. regulation VDE/VDI 3511 and 3512, sheet 3, also DIN 837-1/2. Suitable for sealing are sealing washers to DIN 16258. The correct tightening torque is depending on material and shape of the used seal. It should not exceed 80 Nm. The mounting position should not be subject to strong vibration and radiation heat. The transmitters with digital display are immediately ready for service after the pressure and electrical connections have been made.

B 2.0 Service and Maintenance

The transmitter with digital display described here under is maintenance free. It incorporates no components which have to be repaired or replaced on the site. Repairs will exclusively be carried out at the factory. Depending on working conditions, the pressure transmitter should be checked about once a year to ensure that they are within their specifications and be adjusted if necessary. The calibration procedure is as follows:

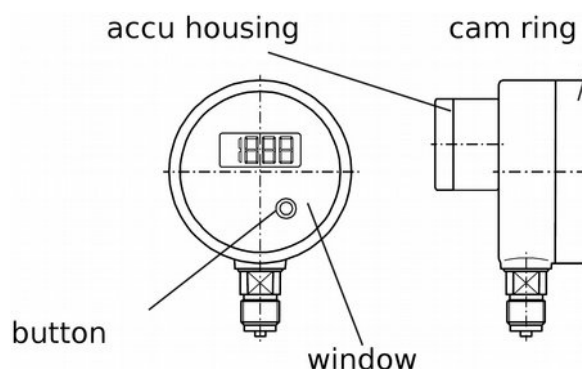
- For readjustment, loosen, with a left-hand rotation, the cam ring (bayonet type), and remove from casing with the window.
- Set zero point by potentiometer „ZERO“.
- Set span by potentiometer „SPAN“.
- After having carried out service and maintenance work, lock tightly the instrument with the cam ring (bayonet type), the window and the sealing.

B 2.1 Power Supply

The rechargeable battery, Order -No.: PMD02-E.EB, has a service life off approx. 500 active hours. In case the display shows "lowbat" continuously, the battery has to be replaced.

B 2.2 Operation

After activating the key, the measured value is displayed during 70 sec.



ABSCHNITT C - Ausführung mit Grenzkontakten

C 1.0 Installation and commissioning

1.1 Mounting

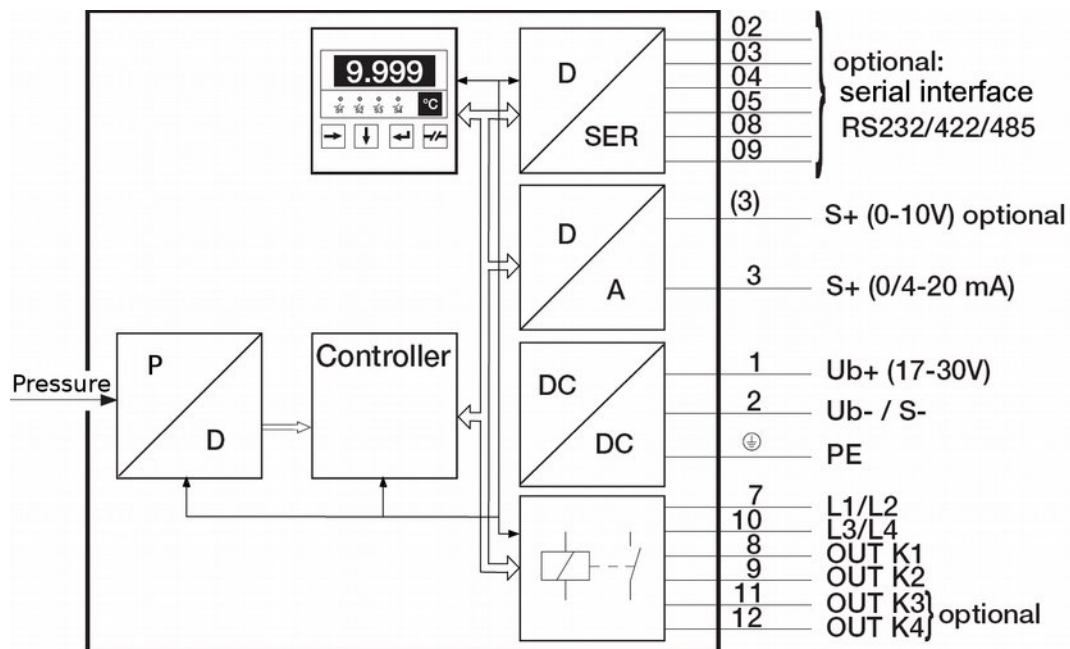
The pressure tapping points should be prepared in accordance with the indications given for the sockets. For more details, see e.g. regulation VDE/VDI 3511 and 3512, sheet 3, also DIN 837-1/2. Suitable for sealing are sealing washers to DIN 16258. The correct tightening torque is depending on material and shape of the used seal. It should not exceed 80 Nm. The mounting position should not be subject to strong vibrations and radiation heat. The mounting position, which the measuring instrument is adjusted for, is indicated on the rating plate. If the device is installed in a different position, the zero point may be offset. In this case, the zero point is readjusted as described in the menu point 10 on page 12.

1.2 Electrical connection

Electrical wiring is made by means of a plug. The wiring schemes can be seen in the drawings. In addition, wiring details and required power supply are given in chapter C 4.0. For the connection and application of the measuring instruments, the VDE regulations on working with high voltage as well as the rules and regulations of the professional associations concerning working with electrical devices and installations have to be observed.

1.3 Electrical Data

Power supply :	$U_b = 17 \dots 30 \text{ V DC}$
Analogue output signal :	$0/4 \dots 20 \text{ mA} / 3 \text{ wire} / \text{load} \leq 400 \text{ Ohm}$ $0 \dots 10 \text{ V} / 3 \text{ wire} / \text{load} \geq 10 \text{ kOhm (optional)}$
Limit switch :	$2 \times 24 \text{ V} / 50 \text{ VA} / 50 \text{ W} / 2 \text{ A}$, (4x optional)
Serial interface :	RS 232 / RS422 / RS485



1.4 Wiring schemes

Ub+ / Ub-	Power supply
S+ / S-	Analogue output signal
L1 / L2, K1, K2	Limit signals 1 und 2
L3 / L4, K3, K4	Limit signals 3 und 4
RxD, TxD, SGND	Serial interface RS232
A, B, SGND	Serial interface RS422 / RS485 half-duplex
-RxD, +RxD, -TxD, +TxD, SGND	Serial interface RS422 / RS485 full-duplex
PE	earth of thread / flange connection

Analogue input signal:

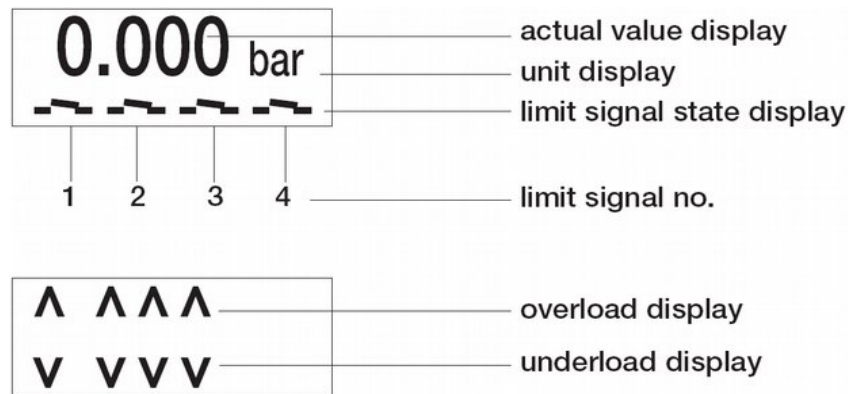
mA+ / mA-	[I] Current
V+ / V-	[U] Voltage

Round Connector		D Sub Connector			
PIN	Signal	PIN	RS232	RS422 / RS485 Half-Duplex	RS422 / RS485 Full-Duplex
1	Ub+	1			
2	Ub- / S-	2	TxD		
3	S+	3	RxD	A	+ TxD
4	V+ / mA +	4			+ RxD
5	V- / mA-	5	SGND	SGND	SGND
6		6			
7	L1 / L2	7			
8	Out K1	8		B	- TxD
9	Out K2	9			+ RxD
10	L3 / L4				
11	Out K3				
12	Out K4				
13					
14	PE				

1.5 System start-up

The measuring instrument is immediately ready for service after its installation into the measuring point and after the electrical connections have been made. At the first commissioning, the display, in a pressureless state, indicates on the last digit 0, 0.0, 0.00 or 0.000, ± 1 .

The four limit switches are open (— — — —). The limit signal numbering 1 - 4 is defined from the left to the right.



2.0 Parameter display and input

Display or input of a parameter are made by the four keys below the display. When the device is switched on, actual value and switching states of the limit signal are displayed (= open, = closed).

By pressing the correspondent button one of the following menus can be started:

Key	Function in the actual value display
	start menu help
	start display menu limit signals
	start input menu
	-

The key functions overview is called up via help menu.

The display menu indicates in succession the lower and upper switching points of the limit signal.

The parameters are set via input menu.

In the display and input menu, the lower quarter of the display shows the menu text. By the keys, the desired parameter is selected as follows:

Key	Function in the actual value display
	to the previous menu point
	to the next menu point
	submenu / start parameter input
	end submenu

The selected parameter is displayed in the upper part of the display. the digit/sign, which can be changed, is presented in inverse order (cursor). When entering the parameters, the key function is as follows:

Key	Function in the actual value display
-----	--------------------------------------

	change cursor position
	change parameter at cursor position
	take over parameter / end input
	reject parameter / end input

Parameter display or input will be ended by activating key  once or repeatedly, or automatically 20s after the last activation of one of the four keys.

Example:

The maximum limit value of limit switch 2 is to be changed

Key	Value	Menu text	Menu
	XX.XX bar	(limit switch display)	actual value display
		display min./max.	1
2x 		adjust limit switch	3
	0000 PIN	adjust limit switch	input
 	XXX ~~X~~ PIN	adjust limit switch	input
		adjust 1. limit switch	3.1
		adjust 2. limit switch	3.2
		limit switch enable	3.2.1
3x 		high limit	3.2.4
	~~XX~~ .XX bar	high limit	input
 	XX.X ~~X~~ bar	high limit	input
		high limit	3.2.4
		adjust 2. limit switch	3.2
		adjust limit switch	3
	XX.XX bar	(limit switch display)	actual value display

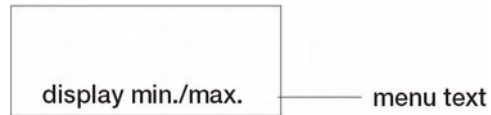
Menu layout and parameter range

Menu	Parameter
1	display min./max. value
1.1	display min. value
1.2	display max. value
2	delete min./max. value
3	adjust limit switch
3.1	adjust 1st limit switch
3.2	adjust 2nd limit switch
3.3	adjust 3rd limit switch
3.4	adjust 4th limit switch
3.x.1	limit switch enable:  contact always open;  contact is switching
3.x.2	contact function:  maximum opens circuit;  maximum closes circuit
3.x.3	low limit: -9999 ... 9999

Menu	Parameter
3.x.4	upper limit: -9999 ... 9999
3.x.5	low limit delay: 00,0 ... 19,9 s
3.x.6	upper limit delay: 00,0 ... 19,9 s
4	integration time
	00,0 ... 19,9 s
5	datalogger
5.1	interval: 1 s ... 24 h
5.2	year: 2000 ... 2099
5.3	date: 01.01 ... 31.12.
5.4	time: 00:00 ... 23:59
6	display unit
6.1	choose unit: mbar, bar, Pa, hPa, kPa, at, kg/cm ² , kp/cm ² , mmH ₂ O, mH ₂ O, mmWs, atm, mWs, Torr, mmHg, mmQs, psi, lb/in ² , inH ₂ O, ftH ₂ O, inHg, or customized unit
6.2	unit input: (customized unit)
6.2.1	text input: 2 x 5 characters
6.2.2	decimal point position: 9.999 ... 9999
6.2.3	zero input: -9999 9999
6.2.4	endpoint input: -9999 9999
7	adjust output
7.1	range zero: -9999 9999
7.2	range endpoint: -9999 9999
8	Serial interface
8.1	baud rate: 1200, 2400, 4800, 9600, 19200, 38400 oder 76800
8.2	data bits: 7 or 8
8.3	parity: - (none), 0, EVEN or ODD
8.4	stop bits: 1 or 2
9	change language
	German, English or French
10	sensor calibration
10.1	decimal point position: 9.999 ... 9999
10.2	zero input: -9999 9999
10.3	endpoint input: -9999 9999
10.4	calibrate zero
10.5	calibrate endpoint
11	calibrate analogue output
11.1	unit input: V or mA
11.2	zero input: 00.00 ... 99.99
11.3	endpoint input: 00.00 ... 99.99
11.4	minimum input: 00.00 ... 99.99
11.5	maximum input: 00.00 ... 99.99
11.6	calibrate zero: 0000 ... 9999
11.7	calibrate endpoint: 0000 ... 9999
12	change PIN
12.1	delete min./max.: 0000 ... 9999
12.2	adjust limit switch: 0000 ... 9999
12.3	integration time: 0000 ... 9999
12.4	Datalogger: 0000 ... 9999
12.5	display unit: 0000 ... 9999
12.6	adjust output: 0000 ... 9999
12.7	serial interface: 0000 ... 9999
12.8	change language: 0000 ... 9999
12.9	calibrate sensor: 0001 ... 9999
12.10	calibrate output: 0001 ... 9999

3.0 Input menu

The input menu is being started by pressing key . Instead of the limit signal state, the display is showing the menu text. The upper part of the display is empty.



The starting point for the selection of a parameter in the description hereunder is the actual value display. Some of the measuring instrument functions are optional. The indications concerning multiple activations of a key (e.g. 5x ) refer to instruments with all options. Menus 2 to 10 are protected through a four-digit PIN each (see menu 11 „enter PIN“). After selection of the menu, the PIN is to be confirmed. The upper part of the display shows value

„0000“ followed by „PIN“. The digit that can be changed by activating key , is marked by the cursor (inverse display). The cursor position is shifted to the left by 1 digit by key 



Enter PIN by pressing buttons , and, and  acknowledge by pressing button .

(In the event the existing PIN = „0000“, this inquiry is not applicable).

A parameter is displayed and input in the same way as the PIN.

3.1 Menu 1, Display min./max. value (maximum pointer function)

The instrument features a maximum pointer function. The minimum and maximum value are displayed.

Key	Value	Menu text
		display min./max.
	XX . XX bar	minimum
	XX . XX bar	maximum
		display min./max.
	(actual value display)	(limit signal display)

3.2 Menu 2, Delete min./max. value (maximum pointer function)

Instrument features a maximum pointer function. The minimum and maximum values are set onto the actual value.

Key	Value	Menu text
		display min./max.
		display min./max.
	0000 PIN	delete min./max. *)
enter PIN by and *)		
		min./max. erased
		delete min./max.
	(actual value display)	(limit signal display)

*) If the PIN for this menu = „0000“, no request is made

3.3 Menu 3, Adjust limit switch

The measuring instrument features 4 limit switches. For each limit switch, the following parameters can be defined:

Key	Value	Menu text
		display min./max.
2x		adjust limit switch
	0000 PIN	adjust limit switch *)
enter PIN by and *)		
		adjust 1. limit switch
select limit signal by		
		limit switch enable
		limit switch enable
by turn release on or off		
		limit switch enable
		contact function
		contact function
by select close or open circuit		
		contact function
		lower limit
	00.00 bar	upper limit
by and enter switching point		

Key	Value	Menu text
		lower limit
		upper limit
	00.00 bar	upper limit
by and enter switching point		
		upper limit
		lower limit delay
	00.0 s	lower limit delay
by and enter time		
		lower limit delay
		upper limit delay
	00.0 s	upper limit delay
by and enter time		
		upper limit delay
3x	(actual value display)	(limit switch display)

*) If the PIN for this menu = „0000“, no request is made

3.4 Menu 4, Integration time (damping)

The measuring instrument features a damping function. The mean value will be obtained during the integration time, displayed as actual value and interpreted for the output signal. Setting on delivery 0.0 (damping off).

Key	Value	Menu text
		display min./max.
3x		integration time
	0000 PIN	integration time *)
enter PIN by and *)		
	00.0 s	integration time
by and enter time		
		integration time
	(actual value display)	(limit switch display)

*) If the PIN for this menu = „0000“, no request is made

3.5 Menu 5, Datalogger

By means of the data logger function, the measuring value will be stored in an adjustable time intervall. The stored measuring values can be read-out via PC. Date, hour, mean value, minimum and maximum values of the measuring value evaluated during the time intervall, are

displayed for each time interval. Date and hour are set on the actual time at the time of delivery. Attention: After missing power supply you have to adjust the real time clock again.

Key	Value	Menu text
		display min./max.
4x		data logger / clock
	0000 PIN	data logger / clock *)
by and enter PIN *)		
		interval
	XXXX s	choose intervall unit
by select unit s, min or h		
		interval
		interval
	XX:XX X	time
by and set up measuring interval; 0 = event control		
		interval
		time
	XX:XX	time
by and set up time		
		time
		date
	XX.XX	date
by and set up date		
		date
		year
	20XX	year
by and set up year		
		year
2x	(actual value display)	(limit signal display)

*) If the PIN for this menu = „0000“, no request is made

3.6 Menu 6, Display unit

For displaying the measuring value, units such as SI, ANSI, BS and technical units are on hand, as well as a unit to be defined by the user (see 3.6.2).

3.6.1 Select unit

Key	Value	Menu text
		display min./max.
5x		display unit
	0000 PIN	display unit *)
by and enter PIN *)		
		display unit
	XX.XX	choose unit
by select unit		
		choose unit
2x	(actual value display)	(limit signal display)

*) If the PIN for this menu = „0000“, no request is made

3.6.2 Establish custom unit

The measured value can be converted into other dimensions. For the conversion, the unit with 2 x 5 signs maximum has to be entered, as well as those values that correspond to the zero point and the end point of the measuring range (see menu 9). Setting on delivery is 0.0 to 100.0 %.

Key	Value	Menu text
		display min./max.
5x		display unit
	0000 PIN	display unit *)
by and enter PIN *)		
		choose unit
		input unit
		input text
	XX.XX %	input text
by and enter unit text		
		input text
		decimal point position
	99.99 xxxxx	decimal point position
by set position of decimal point		

Key	Value	Menu text
		decimal point position
		input zero
	0000.0 xxxxx	input zero
by and enter zero point		
		input zero
		input finish
	1000.0 xxxxx	input finish
by and enter endpoint		
		input finish
3x	(actual value display)	(limit signal display)

*) If the PIN for this menu = „0000“, no request is made

3.7 Menu 7, *Setting of the analog output*

By means of this menu, the relation between the analog output and the measuring range is defined. For that, one measuring point each is assigned to the zero point and endpoint of the analog output (see menu 11). On delivery range of analogue and measuring range are equal.

Key	Value	Menu text
		display min./max.
6x		adjust output
	0000 PIN	adjust output *)
by and PIN eingeben *)		
		measuring range zero
	XX.XX bar	measuring range zero
by and enter value for range zero		
		measuring range zero
		measuring range finish
	XX.XX bar	measuring range finish
by and enter value for endpoint		
		measuring range finish
2x	(actual value display)	(limit signal display)

*) If the PIN for this menu = „0000“, no request is made

3.8 Menue 8, Serial interface

This menu defines the data transmission format of the serial interface. Set-up on delivery: 1200 baud, 8 data bits, no parity, and 1 stop bit. The display value is sent as ASCII characters two times per second.

Key	Value	Menu text
		display min./max.
7x		serial interface
	0000 PIN	serial interface *)
by and enter pin *)		
		baudrate
	1200	baudrate
by select baudrate		
		baudrate
		parity
	-	parity
by select parity		
		parity
		stopbits
	1	stopbits
by select stopbits		
		stopbits
2x	(actual value display)	(limit signal display)

*) If the PIN for this menu = „0000“, no request is made

3.9 Menu 9, Changing the language

The menu text can optionally be displayed in German, English or French. Display setup on delivery is German language.

Key	Value	Menu text
		display min./max.
8x		change language
	0000 PIN	change language *)
by and enter PIN *)		
		deutsch
by select language, German, English, French		
		change language

Key	Value	Menu text
	(actual value display)	(limit switch display)

*) If the PIN for this menu = „0000“, no request is made

3.10 Menu 10, Calibrating the sensor

By means of this menu, the measuring range of the sensor will be adjusted, and the output signal of the sensor at the zero and endpoint of the range will be measured and setup. The settings will be made at the factory by using appropriate pressure standards. Wrong inputs into this menu cause malfunctions of the measuring instrument.

Key	Value	Menu text
		display min./max.
9x 		calibrate sensor
	0000 PIN	calibrate sensor *)
by  and  enter PIN *)		
		decimal point position
	99.99 bar	decimal point position
by  enter position of decimal point		
		decimal point position
		input zero
	00.00 bar	input zero
by  and  enter zero point of sensor		
		input zero
		input finish
	10.00 bar	input finish
by  and  enter endpoint of sensor		
		input finish
		calibrate zero
	0.00 bar	calibrate zero
Connect the measuring instrument to a sufficiently precise pressure standard. At the measuring point, generate the value shown in the display of the instrument and store by  .		
		calibrate zero
		calibrate finish
	10.00 bar	calibrate finish
Connect the measuring instrument to a sufficiently precise pressure standard. At the measuring point, generate the value shown in the display of the instrument and store by  .		
		calibrate finish
2x 	(actual value display)	(limit switch display)

*) A PIN of "0000" is not allowed hier, to change see 3.12

3.11 Menu 11, Calibrating the analog output (optional)

Via this menu, zero point, end point, minimum and maximum value of the analog output are being input, and the output signal will be set on zero and end point input. The settings will be made at the factory by using appropriate pressure standards.

Key	Value	Menu text
		display min./max.
10x		calibrate output
	0000 PIN	calibrate output *)
by and enter PIN *)		
		input unit
		input unit
by select unit V or mA **)		
		input unit
		input zero
	04.00 mA	input zero
by and enter output zero point, see rating plate		
		input zero
		input finish
	20.00 mA	input finish
by and enter output endpoint, see rating plate		
		input finish
		input minimum
	02.00 mA	input minimum
by and enter minimum output value		
		input minimum
		input maximum
	22.00 mA	input maximum
by and enter maximum output value		
		input maximum
		calibrate zero
	0000 mA	calibrate zero
Connect the analog output to a sufficiently precise pressure standard. Type in the number in such a way that the pressure standard shows the value indicated for the zero point.		

Key	Value	Menu text
		calibrate zero
		calibrate finish
	0000 mA	calibrate finish
Connect the analog output to a sufficiently precise pressure standard. Type in the number in such a way that the pressure standard shows the value indicated for the endpoint.		
		calibrate finish
2x 	(actual value display)	(limit signal display)

*) A PIN of "0000" is not allowed hier, to change see 3.12

**) According to factory setting, see rating plate

3.12 Menu 12, setting up PINs

Menus 2 to 10 are protected by means of a 4-digit PIN each.

On delivery the values will be set as follows:

Key	PIN	Menu text
2		delete min./max.
3		adjust limit switch
4		integration time
5		Datalogger
6		display unit
7		adjust output
8		serial interface
9		change language
10		calibrate sensor
11		calibrate output

Menus 2...8: PIN "0000" will not be requested

Menus 9...10: A PIN of "0000" is not allowed to change these parameters

Each PIN can be set individually via menu „enter PIN“. The menu call-up is made by the following key combination:

Key	Value	Menu text
		display min./max.
11x 		change PIN
	PIN	change PIN
 change PIN  to next PIN  to previous PIN  escape from PIN menu		

Key	Value	Menu text
		change PIN
	(actual value display)	(limit signal display)

After selecting the menu, the existing PIN has to be confirmed. In the upper part of the display the value „0000“ is indicated followed by „PIN“. The place that can be changed by key  is marked by the cursor (inverse display). By key , the cursor position is shifted to the left by one digit.



Type the existing PIN by keys  and  and confirm by . In the case of "0000" this confirmation is omitted. In the upper part of the display, the value „0000“ is shown followed by „new PIN“.



Type the desired new PIN by pressing the keys  and  and confirm by .

4.0 Wiring and Pin Layout

pin	signal direction and wiring
1	⇔ Ub +
2	⇔ Ub - / S -
3	⇒ S +
4	
5	
6	
7	⇔ L1 / L2
8	⇒ K1 output
9	⇒ K2 output
10	⇔ L3 / L4
11	⇒ K3 output
12	⇒ K4 output
13	
14	⇔ PE

